

# A High-Power Wideband Cryogenic 200 GHz Schottky “Substrateless” Multiplier: Modeling, Design and Results

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A high-power doubler for the frequency band 184 to 212 GHz has been fabricated and tested. The first circuit measured gives an output power over 30 mW across the band at room temperature with peaks around 48 mW at 190, 200 and 210 GHz. Even better results are expected from future testing under cryogenic conditions at approximately 100 K ambient. These results will be presented at the conference.

The multiplier is based on the “substrateless” monolithic integrated circuit topology reported earlier [1–3]. This yields circuitry with lower loss than conventional MMICs, due to the removal of the semiconductor substrate from beneath most of the metallic traces. Further, it facilitates the optimum design of broadband multipliers by simplifying the transitions between waveguide and diode sections of the circuit.

Since these multipliers are operated at relatively high input power (up to 250 mW), low temperature (down to 100 K) and wide bandwidth (14 %), accurate analysis of the doubler characteristics affected by these conditions is important. The results of the continuing JPL Schottky diode physical modeling effort will be presented, including the effects of temperature and high power operation. Further, a thermal analysis of the doubler will be shown.

The research described in here was carried out at the Jet Propulsion Laboratory, California Institute of technology, Pasadena, California, USA, under contract with the National Aeronautics and Space Administration.

## REFERENCES

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